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PINE SAWTIMBER STUMPAGE PRICES IN SOUTH CAROLINA, 1948-1954

by

James W. Cruikshank

and Walter C. Anderson

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PINE SAWTIMBER STUMPAGE PRICES IN SOUTH CAROLINA, 1948 - 1954

By

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Division of Forest Economics Research

INTRODUCTION

The three-fold purpose of this paper is to show the kind of stumpage price information that is presently available at the State Forester's office, to demonstrate how it can be analyzed to be made useful, and to recommend ways of increasing the availability and improving the quality of this information. South Carolina was selected for this study as an example of all southeastern states.

Both stumpage prices for a series of years and current stumpage prices are needed. Among ways a series of annual stumpage prices can be used are to analyze long-term price behavior and to forecast prices. A knowledge of current stumpage prices is needed by growers offering timber for sale. They know little about stumpage prices because they sell their timber in an unorganized market where there is no established price, and they have little opportunity to become familiar with stumpage prices through experience since they negotiate only a few sales during their lifetime. Suitable stumpage price reports that would satisfy either of these needs are lacking.

The prices analyzed in this paper were from reports by service foresters to the South Carolina Commission of Forestry. Service foresters operate under the Cooperative Forest Management Act of 1950. One service they perform is to mark timber for cutting. For a portion of the tracts marked, they report the price received by the timber seller. About 1500 timber tracts throughout the state were marked for sale between 1948 and 1954. From reports of these sales, 382 usable records were obtained.

Prices reported by service foresters were chosen because they can be more readily analyzed than prices reported by other sources. Since a tally is kept of timber marked on every tract, it is possible to relate price to various stand characteristics. Also, in general, the price received in each sale was the price a timber seller should get if he sold his timber the way foresters advise it should be sold. Each seller knew the volume of timber he was offering for sale, and his tract was marked according to accepted forestry practices.

This paper is restricted to an analysis of prices received by small, private timber growers for sales of marked, pure pine sawtimber stumpage. At the present time, yellow pine is the species of principal interest to timber buyers and sellers alike. Of all the stands marked for sale by service foresters from 1948 through 1954, approximately three-fifths were pine stands; and two-fifths were mixed pine-hardwood stands.

STUMPAGE PRICES BY YEARS

Prices for the State

The average annual price paid per thousand board-feet for marked, pure pine sawtimber stumpage in South Carolina from 1948 through 1954 is shown in table 1. In years when the average price was highest, a greater proportion of sales brought prices in excess of $35 per thousand board-feet. However, the prices received for individual sales do not show any discernible pattern. In some years when the average price was high, all sales took place at relatively high prices. But in other years when the average price was also high, sales took place at a wide range of prices, some as low as those received in years with a low average price.

Table 1.--Average stumpage prices of yellow pine per thousand board-feet Scribner scale, and distribution of sales by price class, 1948-1954

Years	Average price per MBF	Price class		
		Less than $25.00	$25.00 to $35.00	More than $35.00
	Dollars	Percent	Percent	Percent
1948	25.86	37	54	9
1949	23.45	64	28	8
1950	28.44	43	35	22
1951	32.44	21	42	37
1952	35.68	12	38	50
1953	32.39	9	65	26
1954	27.13	45	44	11

Average stumpage prices per thousand board-feet appear lower when expressed in International Scale (¼-inch kerf) and higher in Doyle scale than they do in Scribner (table 2). The Scribner rule is used by service foresters; the Doyle is commonly used by lumbermen. The apparent differences in price among these three rules are due to the fact that International gives the largest scale for average run of log sizes, Scribner somewhat less, and Doyle the least.

Prices by Zones

In order to present average stumpage prices on a more localized basis, South Carolina was divided into three price zones. These zones are shown in figure 1. Throughout the state there was a wide variation in average prices from county to county; there was also a wide variation in the prices received

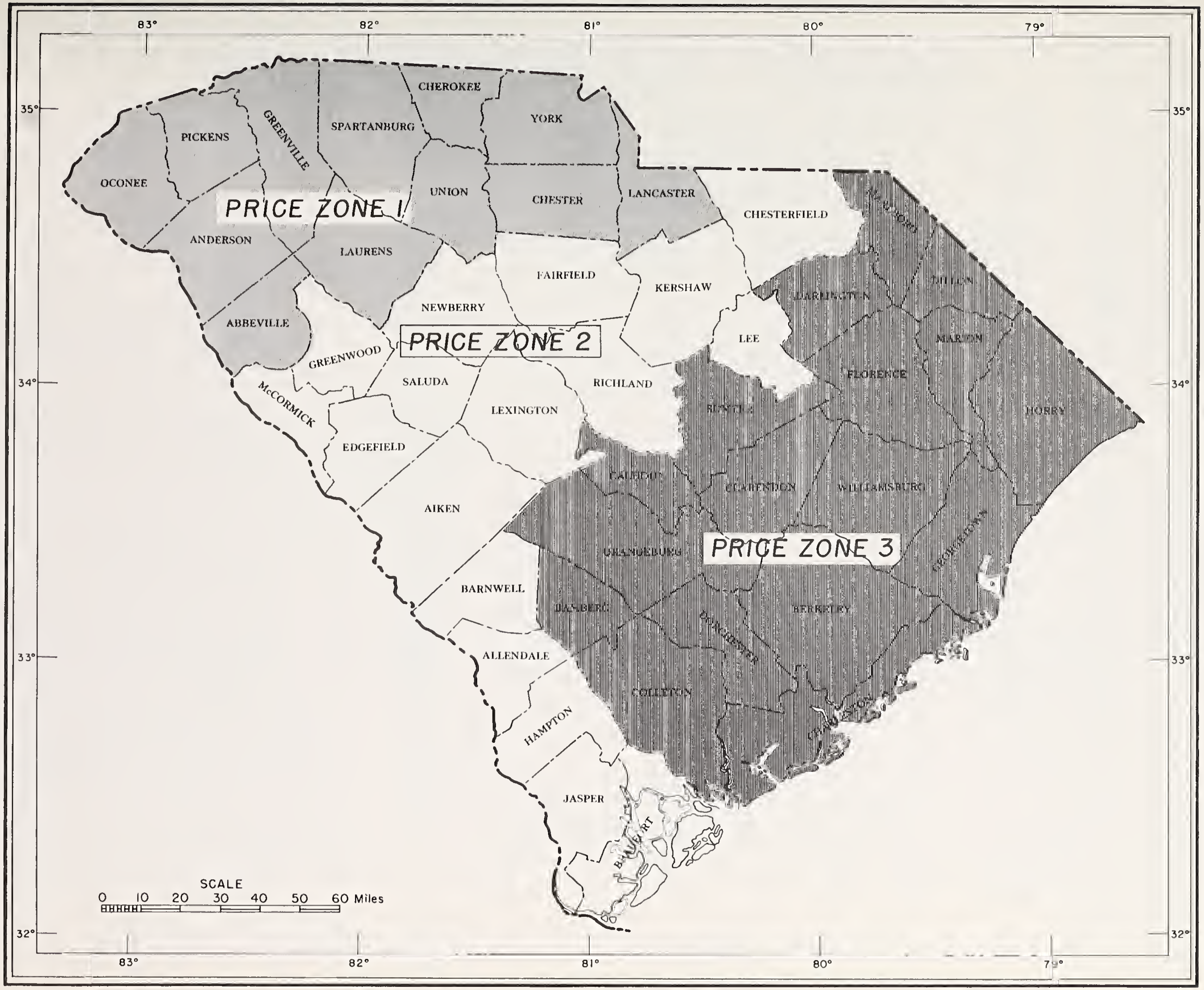

Figure 1.--Stumpage price zones, South Carolina, 1948-1954

for individual sales within each county during a single year. But, on the average, from 1948 to 1954 prices were lowest in the upper piedmont and became progressively higher toward the coast. In this 7-year period, the average price in Price Zone 1 was about five dollars less than that in Price Zone 2, and the Price Zone 3 average price was about five dollars higher than that in Price Zone 2. These differences were statistically significant at the 1-percent level. The average prices in each price zone are shown by log rule in table 3, and the proportion of sales that took place by price class in each price zone is shown in table 4.

Table 2.--Average stumpage prices of yellow pines per thousand board-feet, by log rule, 1948-1954
(In dollars)

Year	Log rule		
	Scribner	International	Doyle
1948	25.86	22.50	35.94
1949	23.45	20.40	32.60
1950	28.44	24.74	39.53
1951	32.44	28.22	45.09
1952	35.68	31.04	49.60
1953	32.39	28.18	45.02
1954	27.13	23.60	37.71

Table 3.--Average stumpage prices of yellow pine per thousand board-feet by price zone and log rule, 1948-1954
(In dollars)

Year	Price Zone 1			Price Zone 2			Price Zone 3		
	Scribner	International	Doyle	Scribner	International	Doyle	Scribner	International	Doyle
1948	22.98	19.76	34.01	23.79	20.94	32.35	27.16	24.17	35.31
1949	20.08	17.27	29.72	20.60	18.13	28.02	26.66	23.73	34.66
1950	20.78	17.87	30.75	24.92	21.93	33.89	33.53	29.84	43.59
1951	23.64	20.33	34.99	32.98	29.02	44.85	38.26	34.05	49.74
1952	30.82	26.50	45.61	34.46	30.32	46.86	40.60	36.13	52.78
1953	26.36	22.67	39.01	36.01	31.69	48.97	35.11	31.25	45.64
1954	20.46	17.60	30.28	27.05	23.80	36.79	34.48	30.69	44.82

Table 4.--Average stumpage prices of yellow pine per thousand board-feet Scribner scale, and proportion of sales by price class in each price zone, 1948-1954

PRICE ZONE 1

Year	Average price per MBF	Price class		
		Less than $25.00	$25.00 to $35.00	More than $35.00
	Dollars	Percent	Percent	Percent
1948	22.98	50	50	--
1949	20.08	83	--	17
1950	20.78	83	17	--
1951	23.64	61	35	4
1952	30.82	22	56	22
1953	26.36	20	80	--
1954	20.46	92	8	--
PRICE ZONE 2				
1948	23.79	64	27	9
1949	20.60	85	15	--
1950	24.92	54	42	4
1951	32.98	10	52	38
1952	34.46	10	48	42
1953	36.01	6	50	44
1954	27.05	40	50	10
PRICE ZONE 3				
1948	27.16	23	68	9
1949	26.66	42	46	12
1950	33.53	22	36	42
1951	38.26	3	36	61
1952	40.60	8	12	80
1953	35.11	--	58	42
1954	34.48	--	75	25

STUMPAGE PRICES FOR INDIVIDUAL TIMBER TRACTS

The stumpage price received for an individual sale depends upon all the conditions that surround that sale. Some of these conditions can be expressed in terms of measurable factors; others cannot. For each price report obtained, the following information was noted for the marked portion of the stand: Average volume per tree, average volume per acre, total volume, and number of acres. This is not an exhaustive list of possible price determinants, but information about other factors that may have affected price was not available.

Relation of Price to Volume per Tree and Volume per Acre

Each of the four factors presumed to be a determinant of price was tested by using multiple correlation methods. Tests were made for each price zone within the state. In every price zone, average volume per tree and average volume per acre were the only factors, of those tested, found to be correlated with price. The correlation of average volume per tree with price was statistically significant at the 1-percent level, and average volume per acre at the 5-percent level. Together, these two factors accounted for 31 percent of the price variance in Price Zone 1, 23 percent in Price Zone 2, and 16 percent in Price Zone 3.

Estimating Method

The correlation of price with average volume per tree and average volume per acre makes possible a better estimate of the market value of a specific tract than is afforded by the average price in the zone. This better estimate can be made by using table 5.

To illustrate how to estimate the market value of a particular stand, assume that a timber grower in Price Zone 2 has his timber marked for a sale. From the tally given him by the forester who did the marking, the grower knows that the average volume per tree of all marked trees is 184 board-feet, and the average volume marked per acre is 2,988 board-feet. The price ratio for this stand, from table 5, is 1.06. The timber grower may learn from neighbors who recently sold timber or from the forester who marked the stand that timber in the vicinity is averaging $26.50 per thousand board-feet. He finds from the same source that for these other stands the average volume per tree of marked trees was 122 board-feet, and the average volume marked per acre was 2,147 board-feet. The price ratio obtained from table 5 for the average of these other stands is .97. The stumpage price he should receive for his stand when an average price of $26.50 is being paid in the vicinity can be calculated as follows:

$$\frac{\$26.50}{.97} \times 1.06 = \$28.96 \text{ per MBF}$$

If a price reporting service issued average stumpage prices periodically, a timber grower could calculate the price for his stand by simply multiplying the reported price by the price ratio for his stand. For example, assume the average stumpage price reported for Price Zone 2 is $27.50.

Table 5.--Stumpage price ratios per thousand board-feet Scribner scale by average volume per tree of marked trees and average volume marked per acre, 1948 - 1954

PRICE ZONE 1

Average volume per tree (Board-feet)	Average volume marked per acre (board-feet)					
	1,000	2,000	3,000	4,000	5,000	6,000
40	.84	.94	1.04	1.14	1.25	1.35
60	.90	1.00	1.10	1.20	1.31	1.41
80	.96	1.06	1.16	1.26	1.37	1.47
100	1.02	1.12	1.22	1.32	1.43	1.53
120	1.08	1.18	1.28	1.38	1.48	1.59
140	1.14	1.24	1.34	1.44	1.54	1.65
160	1.20	1.30	1.40	1.50	1.60	1.70
180	1.26	1.36	1.46	1.56	1.66	1.76
200	1.32	1.42	1.52	1.62	1.72	1.82
PRICE ZONE 2						
40	.86	.88	.90	.92	.94	.96
60	.88	.90	.92	.94	.96	.99
80	.90	.92	.95	.97	.99	1.01
100	.93	.95	.97	.99	1.01	1.03
120	.95	.97	.99	1.01	1.03	1.05
140	.97	.98	1.01	1.03	1.05	1.07
160	.99	1.01	1.03	1.05	1.07	1.10
180	1.01	1.03	1.06	1.08	1.10	1.12
200	1.04	1.06	1.08	1.10	1.12	1.14
220	1.06	1.08	1.10	1.12	1.14	1.16
240	1.08	1.10	1.12	1.14	1.16	1.18
260	1.10	1.12	1.14	1.16	1.19	1.21
280	1.12	1.15	1.17	1.19	1.21	1.23
300	1.15	1.17	1.19	1.21	1.23	1.25
PRICE ZONE 3						
40	.86	.89	.92	.94	.97	1.00
60	.87	.90	.93	.96	.98	1.01
80	.88	.91	.94	.97	1.00	1.02
100	.90	.93	.95	.98	1.01	1.04
120	.91	.94	.97	.99	1.02	1.05
140	.92	.95	.98	1.01	1.03	1.06
160	.93	.96	.99	1.02	1.05	1.07
180	.95	.97	1.00	1.03	1.06	1.09
200	.96	.99	1.02	1.04	1.07	1.10
220	.97	1.00	1.03	1.06	1.08	1.11
240	.98	1.01	1.04	1.07	1.10	1.12
260	1.00	1.02	1.05	1.08	1.11	1.14
280	1.01	1.04	1.06	1.09	1.12	1.15
300	1.02	1.05	1.08	1.11	1.13	1.16

This is the average price for the average stand in the zone. In setting up table 5, a price ratio of 1.00 was given the average stand in each zone. Therefore, this ratio can be dropped from the calculation when reported prices are used. In this case the comparative price could be calculated as follows:

$27.50 x 1.06 = $29.15 per MBF

If a price reporting service issued tables showing the stumpage price for various combinations of average volume per tree and average volume per acre, the above computation would not be necessary. Table 6 shows the prices for various combinations in Zone 2. Such a table would enable the timber owner to estimate directly the price applicable to his class of timber.

Table 6.--Stumpage prices per thousand board-feet Scribner scale, by average volume per tree and average volume per acre, Price Zone 2, 1954

Average volume per tree (Board-feet)	Average volume marked per acre (board-feet)				
	1,000	2,000	3,000	4,000	5,000
	Dollars	Dollars	Dollars	Dollars	Dollars
40	23.26	23.80	24.34	24.89	25.43
60	23.80	24.34	24.89	25.43	25.97
80	24.34	24.89	25.70	26.24	26.78
100	25.16	25.70	26.24	26.78	27.32
120	25.70	26.24	26.78	27.32	27.86
140	26.24	26.78	27.32	27.86	28.40
160	26.78	27.32	27.86	28.40	28.94
180	27.32	27.86	28.67	29.21	29.76
200	28.13	28.67	29.21	29.76	30.30
220	28.67	29.21	29.76	30.30	30.84
240	29.21	29.76	30.30	30.84	31.38
260	29.76	30.30	30.84	31.38	32.19
280	30.30	31.11	31.65	32.19	32.73
300	31.11	31.65	32.19	32.73	33.27

Log Scale Converting Factors for Price and Volume

Table 5 makes possible the calculation of stumpage prices in terms of the Scribner rule only. However, bids may be received in terms of the Doyle rule or lumber measure. Therefore, a timber grower must be able to convert stumpage prices from terms of one rule to another. These conversions can be made by using table 7. For example, assume that the timber grower in Price Zone 2

Table 7.--Multipliers for converting stumpage prices or volumes from terms of one log rule to another, by price zone

TO CONVERT PRICES, find given log rule below, read across to price multiplier under desired price zone and log rule.	TO CONVERT VOLUMES, find price zone and given log rule below, read down to volume multiplier opposite desired log rule.											
	Price Zone 1			Price Zone 2			Price Zone 3			South Carolina		
	Scribner	International 1/	Doyle	Scribner	International 1/	Doyle	Scribner	International 1/	Doyle	Scribner	International 1/	Doyle
Scribner	1.00	.86	1.46	1.00	.88	1.36	1.00	.89	1.30	1.00	.87	1.39
International 1/	1.17	1.00	1.72	1.13	1.00	1.53	1.12	1.00	1.45	1.14	1.00	1.58
Doyle	.68	.58	1.00	.74	.65	1.00	.77	.69	1.00	.72	.63	1.00

1/ Can be assumed to be equivalent to lumber tally.

received a bid on his marked timber of $25.00 per thousand board-feet lumber tally. He would want to compare this bid with the price he had previously calculated, which was in terms of Scribner. International scale is assumed to be equivalent to lumber tally. To find the multiplying factor to make this conversion, he reads down the left-hand column of table 7 to the row marked "International," and then reads across to Price Zone 2. In the cell where the International row intersects the Scribner column, he finds the multiplier "1.13." He can then calculate the equivalent Scribner price of this lumber tally bid as follows:

$25.00 x 1.13 = $28.25 per MBF

Volumes can also be converted from one scale to another by using table 7. The timber grower in Price Zone 2 may, for example, wish to convert the average volume marked per acre in his stand from Scribner to Doyle. He finds the multiplier ".74" in table 7 by reading down the Scribner column under Price Zone 2 until it intersects the row marked "Doyle." The board-foot volume Doyle scale equivalent to 2,988 board-feet Scribner scale is calculated as follows:

2,988 x .74 = 2,211 board-feet

PRICE REPORTS

The need to inform small timber growers of current stumpage prices and to accumulate a series of average stumpage prices could be satisfied by a price reporting service. No such service now exists in South Carolina or in any other southeastern state.

Before a price reporting service can function, decisions must be made with regard to: (1) the kinds of price and related data that will be collected, (2) the sources from which these data will be obtained, (3) the amount of data that will be needed, (4) the factors that affect price, and (5) the frequency with which price reports will be issued.

Kinds of Prices to Collect

The ideal stumpage prices to collect for compiling periodic price reports would be those paid to private timber growers for sales of marked and cruised timber that they were not under compulsion to sell. It may be presumed that in such sales buyers and sellers possessed equal knowledge of the volume and quality of timber being sold, unlike lump-sum sales made without a cruise. It may also be assumed that in such sales, buyers and sellers had similar bargaining positions, in contrast to sales forced by the circumstances of the seller where he wished only to get a specific sum of money as quickly as possible. For these reasons, the average prices paid for marked timber are higher than the average prices for all sales. But to receive these higher prices, timber growers would have to sell marked and cruised stands, not only so they would know what they were selling, but because unmarked sales include small and low-quality trees of little value that lower the price paid. The principal objection to reporting average prices for the general run of sales is that they would tend to perpetuate the lower level of prices.

Sources of Prices

The best source of data for a price reporting service would be those foresters who mark stands for private timber growers. They would have an incentive to collect such data because price reports would be useful to them and the people they serve. Service foresters would be the principal suppliers of these data because of the nature of their work and the fact that they are under the direction of the state forester. Consulting foresters and pulp company foresters may also be willing to cooperate. Service foresters and other cooperators might use Form 1 (shown on following page) to record stumpage prices and other related data. The information required in columns 4 through 7 in this form would have to be collected by making a call-back on the landowner; the rest of it could be obtained from the timber marking record. Unless the landowner reported when his timber was sold, it would be difficult to know when to do this. This difficulty is indicated by the fact that service foresters reported stumpage prices for less than one-third of the timber tracts they marked in South Carolina between 1948 and 1954. For this reason, to get enough prices, it may be desirable to supplement prices from private sales with prices from sales of state and national forest stumpage. Prices received in sales of government timber are, on the average, higher than those received in sales of private timber. Tests would show whether or not stumpage prices from all sources could be combined. If so, they would be combined in the form of price indexes. The current average stumpage price could be obtained by using the average combined price index to adjust the average stumpage price paid in a base year.

Number of Individual Prices Required

The number of sales from which prices would be required to get an average price within a specified limit of error can be estimated from the standard errors obtained in this study. These standard errors are shown in table 8.

Table 8.--Standard errors of mean for average stumpage prices per thousand board-feet Scribner scale, by price zone, 1948-1954

Year	Price Zones						South Carolina	
	Price Zone 1		Price Zone 2		Price Zone 3			
	Dollars	Percent	Dollars	Percent	Dollars	Percent	Dollars	Percent
1948	3.00	13.0	1.50	6.3	1.62	6.0	1.11	4.3
1949	3.66	18.2	.96	4.7	1.26	4.7	.93	4.0
1950	1.22	5.9	1.40	5.6	1.34	4.0	1.03	3.6
1951	1.24	5.2	1.67	5.1	1.38	3.6	1.06	3.3
1952	1.95	6.3	1.26	3.6	1.88	4.6	1.05	2.9
1953	.86	3.3	1.96	5.4	1.47	4.2	1.10	3.4
1954	.96	4.7	1.38	5.1	.94	2.7	1.06	3.9

REPORT OF PURE-PINE SAWTIMBER SALES

South Carolina

Period covered: ________ to ________

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
											For office use only		
Price zone (Code)	County	Timber seller	Date of sale	Total price received	Bidders	Product for which purchased	Stand quality	Acres marked and sold	Volume marked and sold	Pine trees marked and sold	Average price received per MBF	Average volume per tree	Average volume per acre
	Code	Code	Mo.-Yr.	Dollars	Number	Code	Code	Number	MBF	Number	Dollars	MBF	MBF

Signature ______________________

Date ______________________

Form 1--Sample Report Form for Collecting Stumpage Price Data

In calculating the number of prices required, it was assumed that the same price variance would be obtained in other samples that was obtained in this one. The estimated number of prices required to calculate average prices with an acceptable error of $0.50, $1.00, or $1.50 for each price zone and for the state is shown in table 9. If this number of prices is obtained, the chances will be only 5 out of 100 that the true price and the estimate differ by more than the specified error.

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It can be seen from the table that if the acceptable limit of error for the average price was set at $1.50 for each price zone, enough prices would be collected to get a state average within an error of $1.00. In the period 1948 to 1954, an error of $1.50 in the average price would have given a range of errors of 4.9 to 7.5 percent in Price Zone 1, 4.2 to 7.3 percent in Price Zone 2, and 3.4 to 5.6 percent in Price Zone 3. In this same period, an error of $1.00 for the state would have given a range of errors of 2.8 to 4.3 percent.

Table 9.--Number of prices required to estimate average price within acceptable error
(Number of price reports)

Acceptable error 1/ (Dollars)	Price Zone 1	Price Zone 2	Price Zone 3	South Carolina
.50	556	734	795	1,009
1.00	139	184	199	252
1.50	61	82	88	113

1/ Two standard errors.

Factors That Affect Price

The determinants of stumpage prices must be known in order to apply average prices to specific stands. To select these price determinants, stumpage prices and related data from individual sales are needed for analysis. Four factors thought to affect stumpage prices were tested in this study and, as has been shown, two were correlated with price. Other factors which may also be correlated with price were not tested because no information was available about them. Some additional factors that should be tested are type of product, quality of stand, and number of bidders. Product may be a determinant of price since, for example, higher prices are generally paid for stumpage when logs are to be cut for export than when they are to be converted into lumber at a nearby mill. Stand quality was partially taken into account in this study since one indicator of it, average volume per tree, was tested and found to be significant. A better measure of quality would be a classification of the total volume into log or tree grades. The number of bids received may be the most important factor that was not tested. In sales of farm timber in Georgia, Todd and Zirkle[1] found little or no difference between prices received for 1- and 2-bid sales, but 3- to 6-bid sales brought much higher prices. Also, Guttenberg[2] found that the number of bids received was the factor most highly correlated with stumpage prices paid for national forest timber in East Texas, Louisiana, and Missis

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Frequency of Price Reports

Average annual stumpage prices may be adequate for a price series, but timber sellers would probably prefer to have price reports issued semiannually or quarterly. It would be difficult to issue an average price, based on field reports, more frequenly than once a year. Prices from the same number of sales would be needed to calculate each average price if the same degree of accuracy were required for each report. Not enough sales would take place in any price zone in periods of less than a year to calculate an average price with a high degree of accuracy. Of course, average prices for these intervening periods may be useful even with less accuracy. To increase the number of sales that would take place in each price zone, larger zones could be delineated that extended across state lines. But even if this were done, the shorter the interval the average price represented, the more effort would be required to collect prices for sales that were completed during the interval. This difficulty might be eliminated if timber sellers reported by mail the date their timber was sold and the price they received for it. Also, price reports would have to be issued more speedily if a short interval were used than a longer one, because prices would go out of date more rapidly. This difficulty could perhaps be overcome by correlating stumpage prices with a time series for which reports were issued quarterly or monthly. Prices could then be reported for the intervening quarters on the basis of this other series.

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[1] Todd, A. S., Jr., and Zirkle, J. J., Jr. Marketing farm timber in Monroe County, Georgia. Southeastern Forest Expt. Sta. Station Paper 3, 33 pp., illus. 1949.

[2] Guttenberg, S. Southern pine stumpage price analysis. Southern Forest Expt. Sta. Unpublished progress report. 1954.

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